News focus

Genes in behaviour scrutiny

Completion of the draft human genome sequence has heightened interest in what it might reveal, no more so than in the field of behavioural genetics. But a new report cautions against early claims and argues that controls will be necessary to protect the public from potential future misuse. **Nigel Williams** reports.

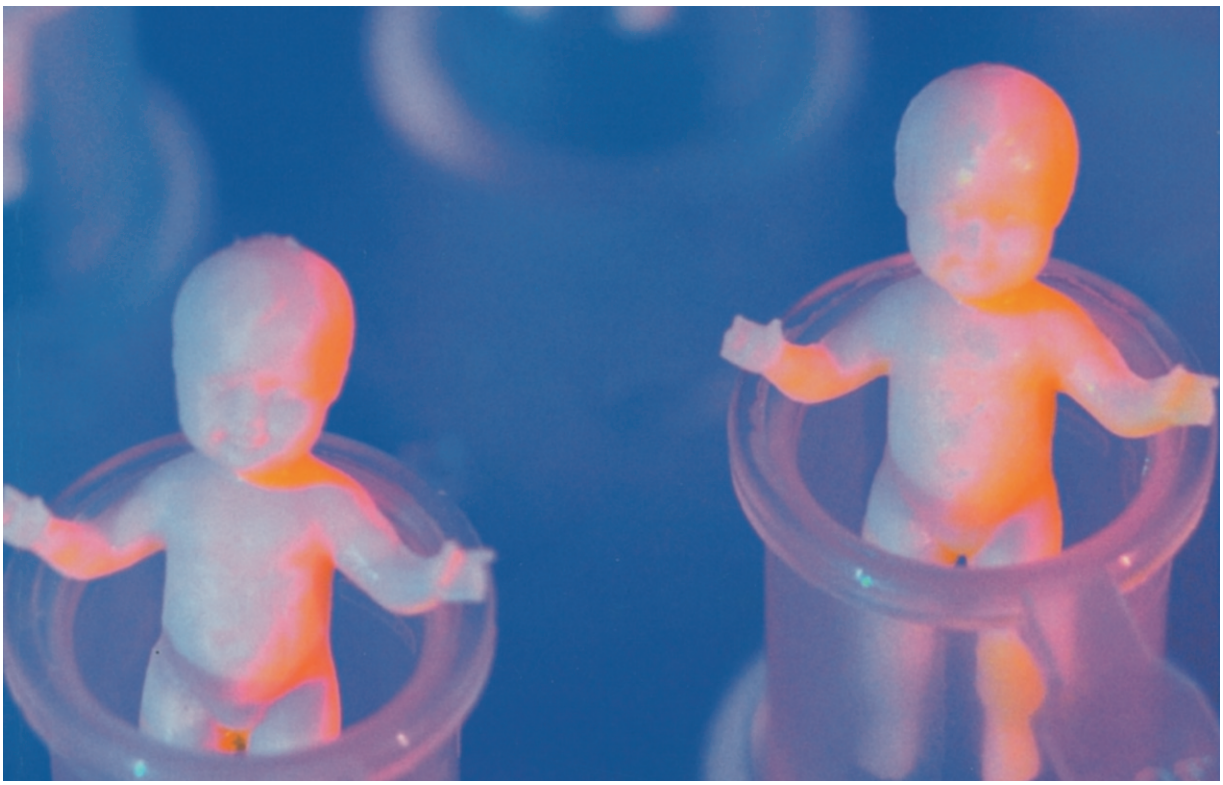
Stringent controls are necessary on the potential use of genetic information that may throw light on the range of normal human behaviour and little useful has yet emerged, a new report concludes. Parents should not be allowed to choose, or even know about the intelligence, sexual orientation or personality traits of their future children, the report says in advice presented to the British government earlier this month.

The technique of preimplantation genetic diagnosis which is only used at present to identify serious inherited disorders, should not be extended to genes that affect behaviour. Abortion of a foetus on the basis of information about 'normal' behavioural traits would be morally unacceptable, the new guidelines published by the Nuffield Council on Bioethics says.

An important initial issue was whether it is possible to talk about a 'normal range' of behavioural traits. It was therefore emphasised by the working party that when they used the term 'normal variation' or 'behaviour in the normal range', the phrases are being used in a statistical sense with 'normal' referring to the range of variation, usually that which includes about 95 per cent of the population and which is not thought to contain any individuals with clinical orders or diseases.

"This is potentially an explosive area, and the first question we asked was whether such research should be carried out at all," says Bob Hepple, chairman of the working group. "We concluded that it can be justified because it has the potential to advance our understanding of human behaviour. However, it is important to create safeguards."

Some inherited conditions — cystic fibrosis, muscular dystrophy and so on — can be identified by changes in a single gene. Some potential illnesses — cancer, heart disease, diabetes — depend on the interaction of the environment and whole suites of genes. But the working party looked at the thorniest topic of all: the genes that might dispose to alcoholism, or gambling addiction, eccentricity or absent-mindedness, thrill-seeking



Behaviour scrutiny: Details from the cover of a new report on human behavioural genetics. Although it finds little clear evidence yet of links between genes and normal behaviour, it recommends stringent controls on possible future developments.

behaviour or acute shyness, aggression, depression and so on.

Such research raises grim reminders of eugenic policies in the US, some European countries and Nazi Germany more than 60 years ago. It raises the danger that genes might be used as glib explanations for complicated human responses. It raises a worrying possibility that some behaviour now seen as within the range of the normal could be turned into a 'medical' problem.

"It is common to hear of research that claims to identify a gene for aggression or a gene for homosexuality. But how could our genes cause us to act in a particular way?" the report asks. "The connection between genes and diseases is far from straightforward, and the relationship between genes and behaviour is even more complicated."

The team highlight the different approaches to the study of genetic influences on human behaviour. First, there are observational studies, which involve assessing and comparing relatives such as twins or siblings, families and adopted children. This is quantitative genetics and aims to examine the extent to which variation in a trait is influenced by genetic factors in a population. It uses statistical methods to examine and compare groups of people.

Secondly, researchers can try to to identify differences in genes that contribute to trait variation between individuals using the technique of molecular genetics. Thirdly, researchers can look at animals to try to examine the effects of particular genes on behaviour.

The reviews of the evidence the working party carried out showed that there are very few confirmed and replicated findings yet in molecular genetics. No individual gene has been identified in humans that influences sexual orientation, anti-social behaviour or intelligence within the normal range. One gene variant, monoamine oxidase A (MAOA), has been associated with low intelligence and aggression but so far, only in one family. One study has indicated an effect of this genotype when combined with poor environmental conditions in male children, but this study awaits replication, the report says.

Another gene variant, the dopamine receptor D4 gene (DRD4), has been associated with a handful of personality traits, psychiatric conditions and other behaviours, but the evidence remains inconclusive for its association with traits in the normal range. A gene that affects brain serotonin levels has been associated with anxiety and an alcohol-metabolizing gene that protects against alcoholism has also been identified although this can be viewed as relating to a trait outside the normal range.

"In the light of the lack of findings that have been replicated in research on behavioural genetics using molecular genetics techniques, there are currently no potential applications for the research," the report says. "Thus claims of such things as 'gay genes' or 'smart mice' convey a highly inaccurate impression of the state of research. These difficulties are not unique to research in behavioural genetics but it does seem that such research is, at present, particularly susceptible to reporting may be misleading in the impression it gives to the reader".

The team argues that researchers and the media have a duty to report genetic findings in a responsible manner. It also calls for the Department of Health to create a new agency to monitor and even control the use of future drugs designed to modify behaviour in people "who would not necessarily be thought of as exhibiting behavioural traits outside the normal range."

It calls for guidelines ahead of any research into gene therapy for normal behavioural traits, along with stringent monitoring of any such genetic tests that might be made available to the public. It also stresses that genetic information about behaviour does not absolve an individual from responsibility for an offence. It was unlikely that the science of genes and behaviour would ever be accurate enough to make predictions about behaviour, it says.

"Where a person has not yet committed a crime, we do not feel that it is justifiable to try to predict behaviour with a view to detaining that individual," said Hepple. "This applies equally whether the information is based on genetic or non-genetic influences."

George Radda, head of Britain's Medical Research Council, said the research needed to be guided by ethical debate, but it should nonetheless be part of modern psychological research. "Research into behavioural genetics an provide pieces of the scientific jigsaw which have been unavailable until now."

But current MRC policy does not allow for the provision of grants for what it sees as research on 'normal' variations in behaviour or personality. The council notes that research into genetic influences on traits such as 'general intelligence' could have value but that the MRC does not give grants for such work as it has a medical remit and benefits of potential work do not clearly outweigh the risks.

Raj Persaud, a consultant psychiatrist at the Maudsley Hospital in London, said research into genetics of behaviour had profound social and ethical implications. "If I know I have a high genetic loading for schizophrenia I can take care not to smoke cannabis, improve my coping skills and avoid severe stress. It is often environmental factors that decide whether genes get expressed or not."

The report recommends that the use of genetic information about behavioural traits in the normal range should not be used by insurance companies in setting premiums. Further discussion of possible legislation should include specific consideration of genetic information regarding behavioural traits. "If the use of such information was considered, a thorough examination of the accuracy and reliability of any genetic tests and their likely predictive power would be essential."